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MARYLAND ENTOMOLOGICAL SOCIETY

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The purpose of the Maryland Entomological Society, which was formed in November, 1971, is to promote the science of entomology in all its branches, to provide a meeting place for professional and amatuer entomologists residing in Maryland and the District of Columbia, to issue a periodical and other publications dealing with entomology and to facilitate the exchange of ideas and information through its meetings and publications.

Membership in the Society is open to all persons interested in the study of entomology. All members receive the journal, Maryland Entomologist, and monthly newsletters, Phaeton. Institutions may subscribe to the Maryland Entomologist but may not become members. Prospective members should send to the Treasurer full dues for the current year, together with their full name, address, telephone number, and special entomological interests.

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Back issues of the Maryland Entomologist and recent issues of Phaeton are available, to members, from the Treasurer. Phaeton is .25¢ per number and the Maryland Entomologist is $1.25 per copy.

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The Maryland Entomological Society is a non-profit, scientific organization. Meetings are held on the third Friday of every month (from October to May) at 8:00 p.m., in Lecture Hall #120 of the Biological Sciences Building, University of Maryland Baltimore County.

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Cover illustration: The logo of the Maryland Entomological Society features the Maryland Shield and a specimen of Euphydryas phaeton (Drury), the Baltimore checkerspot, which became the official insect for the state of Maryland through the efforts of many of the members of this Society.

THE MELOIDAE (COLEOPTERA) OF MARYLAND

C. L. Staines, Jr.

Meloidae is a family of moderate to large-sized beetles (3 to 30 mm.) with soft bodies. The common name of this group (blister beetles) arose because certain species contain cantharidin, a substance that causes blisters on skin. Sexual dimorphism is pronounced in many genera.

Adults are usually phytophagous and may cause economic damage. Larvae are predaceous on eggs of grasshoppers (Orthoptera: Acrididae), contents of nesting cells of bees (Hymenoptera) or eggs of other species of Meloidae (Selander, 1981). Generalized life cycles are as follows:

1. Egg Predator--Eggs are laid in or around the soil near the breeding ground of the host. The first instar larvae (triungulin) disperse from the egg mass and begin searching for a host egg mass. Once host material is contacted, feeding begins. One larva will consume the contents of one egg mass. Larvae are cannibalistic on other meloids contacted.

2. Bee Nesting Material Predator--Eggs are laid in the soil. After hatching, the triungulins tend to climb upward and may congregate on flower blossoms. When a bee alights, the triungulins attach themselves and are carried back to the nest. The preferred food is pollen and nectar but the host egg or larva will be killed when contacted (Erickson, et al., 1976).

The taxonomy of this family is unsettled, particularly in the arrangement of the higher taxa. At present, there are more than 2000 species recognized worldwide; most are found in arid areas (Arnett, 1973). There are 25 species recorded from Maryland.

Key to the Maryland genera

(modified from Arnett, 1973)

1. Tarsal claws without serrations, cleft to base.....2
   Tarsal claws cleft to base, with serrations on upper blade (or simple, not serrate, with a much reduced tooth near the base, and elytra very short).....5
2. Anterior femora with silky pubescence beneath.....*Epicauta*
   Anterior femora without silky pubescence.....3
3. Antennae filiform, several apical segments cylindrical.....*Pyrota*
   Antennae externally robust, several apical segments moniliform or flattened.....4
4. Fully winged, elytra long.....*Lytta*
   Apterous, elytra somewhat shortened.....*Meloe*
5. Antennae short and robust, segments somewhat moniliform, third not more than twice as long as broad.....6
   Antennae of moderate length, more or less filiform, third segment considerably more than twice as long as broad.....7
6. Tarsal claws serrate; elytra normal or only slightly truncate.....*Tricrania*
   Tarsal claws simple; elytra and wings rudimentary.....*Hornia*
7. Mandibles short, stout, abruptly rounded forming nearly a 45° angle at a point slightly more than half their length.....*Zonitis*
   Mandibles moderately long, sides evenly rounded from base to apex.....*Nemognatha*

Meloe

Adult *Meloe* are sluggish, unwary beetles most often encountered feeding on herbaceous plants or moving clumsily on the ground. All Maryland species except *M. americanus* Leach are diurnal. Adults are not gregarious but tend to be generally distributed throughout an area. Larvae are predators on bee nesting material.

There is great individual variation in adult *Meloe*. Females tend to be larger than males. Males have antennal segment V modified into a platform by apical expansion of the segment. Hind wings are absent; elytra are abbreviated. Body color usually black to metallic blue, rarely green or violet. Scutellum is reduced.

There are 146 species of *Meloe* worldwide, with 23 in the New World (Pinto and Selander, 1970). Five species have been recorded from Maryland. An additional species is included because it may be found in Maryland.

Key to Maryland species

(adapted from Pinto and Selander, 1970)

1. Punctures on head and pronotum fine to coarse, at least moderately dense.....2
   Punctures on head and pronotum fine, sparse.....5
2. Punctures on head and pronotum not coarse.....3
   Punctures on head and pronotum coarse, discreet.....angusticollis
3. Outer spur of hind tibiae straight in lateral view, with apical portion not produced anteriorly.....campanicollis
   Outer spur of hind tibiae not straight in lateral view, with apical portion produced laterally.....4
4. Last segment of maxillary palpi at most as long as segment II; sixth abdominal sternum typically entire.....niger
   Last segment of maxillary palpi about 1/6 longer than segment II; sixth abdominal sternum feebly emarginate.....dianella
5. Pygidium subtrapezoidal, with posterior margin straight or broadly rounded, lacking a distinct posterior flange; sixth visible sternum distinctly notched; sides of pronotum straight, evenly convergent behind.....impressus
   Pygidium subtriangular, with a distinct narrow posterior flange; sixth visible sternum feebly emarginate; sides of pronotum at least slightly sinuate.....americanus

Meloe americanus Leach

Almost entirely black to moderately metallic blue; surface dull or feebly shiny. Head as long as wide, widest across eyes. Pronotum typically longer than wide; sides sinuate posteriorly; posterior margin not fully visible from above. Pygidium subtriangular, often notched apically; narrow flange along posterior margin in female (flange poorly developed or absent in male). Sixth visible abdominal sternum emarginate. Male antennae with segment VII attaining base of pronotum: V not flared apically. Female antennae with segment VI-VII attaining base of pronotum. Length 7-17 mm. (Pinto and Selander, 1970).

Ecology: Adults are active from fall to spring whenever temperature permits. Adult food plants are Iva sp. (Compositae) and Ranunculus spp. (Ranunculaceae). Larval hosts are unknown. Pinto and Selander (1970) report collecting Augochloropsis metallica metallica (Fabricius) and Halictus ligatus Say (Hymenoptera: Halictidae) with attached triungulin.

Range: Eastern Nebraska east to southern Ontario and Connecticut, south to the Gulf Coast, then west to central Oklahoma and Texas.

Specimens examined: DISTRICT OF COLUMBIA: 30/III/--, 16/IV/--, 24/IV/--, Pinto and Selander (1970) report from ANNE ARUNDEL CO.: Chesapeake Beach. MONTGOMERY CO.: Cabin John, Plummers Island.

Meloe angusticollis Say

Black, with slight metallic blue coloration on antennae and legs, to bright metallic blue throughout; surface dull to very shiny. Head as long as wide, widest slightly above the eyes. Pronotum as wide as long; sides most strongly convergent at base; posterior margin fully visible from above. Pygidium broadly rounded. Male antennae with segment VII or VIII attaining base of pronotum; VI rather narrow, always at least slightly longer than wide. Female antennae with segment VII attaining base of pronotum. Sixth visible abdominal sternum emarginate (more strongly in male). Length 9-19 mm. (Pinto and Selander, 1970).

Ecology: Adults are active in the spring. Adult food plants are Arisaema triphyllum (L.) (Araceae); Carex pennsylvanica Lam. (Cyperaceae); Elymus villosus Muhl. (Gramineae); Taraxacum officinale Wiggers (Compositae); Galium aparine L., G. triflorum Michx. (Rubiaceae); Chaerophyllum procumbens (L.) (Umbelliferae); Ulmus rubra Muhl. (Ulmaceae) fallen fruits; Claytonia virginica L. (Portulacaceae); and Ranunculus spp.

Triungulin are active when the first woodland plants begin to flower. Larval hosts are unknown. Pinto and Selander (1970) report collecting the following Hymenoptera with attached triungulin: Andrena carlini Cockerell, A. cressoni Robertson, A. distans Provancher, A. sayi Robertson, A. violae Robertson (Andrenidae); Anthophora fureata terminalis Cresson (Anthophoridae); Colletes inaequalis Say (Colletidae); Agapostemon radiatus (Say), Evylaeus cinctipes (Provancher), E. macoupinensis (Robertson), Nomada sp. (Halictidae); and Ceratina calcarata Robertson (Xylocopidae).

Range: Northern North America.

Specimens examined: BALTIMORE CO.: Parkville, 17/VIII/71. CALVERT

CO.: Island Creek, 18/IV/76. FREDERICK CO.: Frederick, Spring 1981. MONTGOMERY CO.: Plummers Island, 4/VI/02. DISTRICT OF COLUMBIA: 27/III/03, 27/IV/--, 1/V/07.

Meloe campanicollis Pinto and Selander

Black to feebly metallic green or, less commonly blue; surface generally dull, rarely slightly shiny. Head as long as wide, widest at tempora. Pronotum as long as wide; posterior margin fully visible from above, sometimes feebly depressed medianly. Pygidium broadly to subacutely rounded. Male antennae with segment VII attaining base of pronotum; segments VI and VIII as long as wide. Female antennae with segment VIII attaining base of pronotum. Sixth visible abdominal sternum emarginate (more strongly in male). Length 11-17 mm. (Pinto and Selander, 1970).

Ecology: Adults are active in late fall and winter. Adult food plants are Ranunculus spp., Clematis spp. (Ranunculaceae); Brassica rapa L., B. nigra (L.) (Cruciferae); Medicago sativa L., Trifolium pratense L. (Leguminosae); Allium spp. (Lilliaceae); Avena sativa L., and Triticum aestivum L. (Gramineae). Larval host unknown.

Range: Nebraska east to Massachusetts, south to southeastern Texas, Mississippi and northern Georgia.

Specimens examined: ANNE ARUNDEL CO.: Edgewater, 23/XII/82. Pinto and Selander (1970) report from MONTGOMERY CO.: Cabin John, Plummers Island, Potomac. PRINCE GEORGES CO.: Beltsville, Riverdale. WORCESTER CO.: Snow Hill.

Meloe dianella Pinto and Selander

Black to feebly metallic green or blue; surface moderately shiny. Pronotum as long as wide; sides straight and gradually convergent posteriorly; posterior margin fully visible from above. Pygidium subtriangular. Male antennae with segment VIII attaining base of pronotum; V robust, with rather well defined platform at apex; VI and VII as long as wide. Female antennal segment VIII attaining base of pronotum. Sixth visible abdominal sternum emarginate (more strongly in male). Length 6-11 mm. (Pinto and Selander, 1970).

Ecology: The winter is passed as diapausing adults. Activity begins in the spring. Adult food plants are Ranunculus spp. and Myosurus minimus L. (Ranunculaceae). Larval hosts are unknown. Pinto and Selander (1970) report collecting the following Hymenoptera with attached triungulin: Hyalaeus modestus Say (Colletidae); Augochlorella pura pura (Say), A. metallica metallica, Halictus ligatus Say (Halictidae); Megachile brevis Say, Osmia georgica Cresson, O. pumila Cresson (Magachilidae); Ceratina calcarata Robertson, and C. dupla Say (Xylocopidae).

Range: British Columbia east to Nova Scotia and south to northern Utah, Texas, Kentucky, Pennsylvania and New Jersey.

Specimens examined: None. Pinto and Selander (1970) record from Pennsylvania and New Jersey. This species may be found in Maryland.

Meloe impressus Kirby

Black to, more commonly, brilliant metallic blue, violet, or green; surface dull to shiny. Head as long as wide, widest at tempora or slightly above the eyes. Pronotum as wide as long; sides straight posteriorly, evenly convergent to base; posterior margin sometimes slightly depressed at midline, fully visible from above. Pygidium trapezoidal; posterior margin straight or weakly rounded. Male antennae with segment VII attaining base of pronotum; V distinctly flared apically, produced anterodorsally; VI and VIII as wide as long. Male with sixth visible abdominal sternum broadly, shallowly emarginate, without a posterior projection at center of emargination. Female antennae with segment VI attaining base of pronotum. Female with sixth visible sternum distinctly notched. Length 6-17 mm. (Pinto and Selander, 1970).

Ecology: Adults are active in summer and fall. Adult food plants are: Ranunculus spp., Clematis spp., Hepatica sp., Anemone hupehensis var. japonica (Thunb.) (Ranunculaceae); Brassica rapa, Impatiens aurea Wats., I. biflora Walt. (Balsaminaceae); and Solanum tuberosum L. (Solanaceae).

Larval host unknown. Pinto and Selander (1970) report collecting the following Hymenoptera with attached triungulin: Andrena carlini, A. mandibularis (Andrenidae); Apis mellifera L. (Apidae); and Colletes inequalis (Colletidae). Larvae are active when the first woodland plants begin to flower.

Range: North America, confined to the mountains in the southern sections.

Specimens examined: ALLEGANY CO.: Green Ridge State Forest, 8/XI/77. ANNE ARUNDEL CO.: Crownsville, 25/XI/72. BALTIMORE CO.: Catonsville, X/66. CHARLES CO.: no locality, 10/XI/74. FREDERICK CO.: Catoctin, 17/IX/81; Myersville, 2/IX/15; Thurmont, 12/IX/76. GARRETT CO.: Swallow Falls, 23/IX/78. MONTGOMERY CO.: no locality, 21/IX/42; Cabin John, 1920; Plummers Island, 12/IX/17, 12/IX/15. PRINCE GEORGES CO.: Beltsville, 14/X/69, 9/X/71, IX/75; College Park, 28/X/60, summer 1981. WASHINGTON CO.: Hagerstown, 4/XI/14. WORCESTER CO.: Snow Hill, 11/X/71.

Meloe niger Kirby

Black to moderately metallic blue or, less commonly, green; surface dull to moderately shiny. Head variable, wider than long; widest above eyes. Pronotum wider than long; sides straight or broadly arcuate, typically evenly convergent posteriorly. Pygidium broadly rounded to angulate. Male antennae with segment VIII or IX attaining base of pronotum; V moderately compressed laterally with a narrow, elongate, very poorly defined platform at apex. Male with sixth visible abdominal sternum broadly, rather shallowly emarginate. Female antennae with segment IX or X attaining base of pronotum. Female with sixth visible sternum entire. Length 8-18 mm. (Pinto and Selander, 1970).

Ecology: Adults are active in spring. Adult food plants are Ranunculus sp., Anemone sp.; Taraxacum officinale; Trifolium pratense; Allium spp., Asparagus officinalis L. (Liliaceae).

Reported larval hosts are Colletes fulgidus Swenk, Nomia melanderi Cockerell (Halictidae); and Anthophora urbana urbana Cresson (Erickson, et. al., 1976; Mayer and Johnson, 1978).

Range: North America.

Specimens examined: None. Pinto and Selander (1970) report from BALTIMORE CO.

Pyrota

There are 28 species of Pyrota in the United States (Selander, pers. comm.). The genus has not been systematically studied until recently (Selander, in press). Prior to this revision the literature contains scattered notes, mostly new species descriptions. There is little published biological information. One species is found in Maryland.

Form elongate, moderately slender; body coloring mostly yellowish, usually spotted or striped with black. Pronotum longer than wide. Elytra each with four fine costae, surface usually rugulose. Tibial spurs simple. Antennae relatively short, robust, seldom extending beyond the base of elytra. Maxillary palpi in male usually modified but variable in shape.

Pyrota mutata Gemminger

Head black with large frontal space yellow. Pronotum reddish-yellow with two round discal black spots. Elytra densely punctured, subopaque, yellowish; with a sutural vittata broader posteriorly, extending nearly to base. Legs brownish-black, basal half of femora and tibiae yellow. Length 9-12 mm. (Horn, 1880).

Ecology: Adults feed gregariously on floral parts of Cicuta sp. and Eryngium spp. (Umbelliferae) (Selander, 1964). Adults are diurnal. Larval hosts are unknown.

Range: Massachusetts to Florida west to Missouri.

Specimens examined: BALTIMORE CO.: Butler, 9/VII/80. PRINCE GEORGES CO.: Croom, 17/IX/76; Laurel, 18/VII/42; Upper Marlboro, 2/VII/67. ST. MARYS CO.: Patuxent Naval Air Station, 27/VII/71. WASHINGTON CO.: Big Pool, 8/VII/76. WORCESTER CO.: Pocomoke Swamp, 13/VII/68.

Lytta

Adult Lytta are slow-moving unwary beetles that feed gregariously. All species in Maryland are diurnal but spend the night on their food plant. All species are univoltine. Adults are active in April and May; individual beetles live only two or three weeks. Larvae are predators on bee nesting material. Hymenopterous hosts are unknown for most species.

There are 128 species of Lytta worldwide, with 51 species in North America (Selander, 1960). Three species have been recorded from Maryland, all in the subgenus Pomphopoea.

Elytra and hind wings fully developed. Upper surface of body sparsely pubescent to glabrous; under surface always pubescent. Pubescence fine, never obscuring surface or contributing appreciably to the over-all color of the beetle. Antennae elongate, basically moniliform, usually longer in males. Outer hind tibial spur usually thicker than inner one, usually obliquely truncate. Tarsal claws cleft to base; blades smooth, never serrate.

Key to Maryland species

1. Body color greenish.....2
   Body color brownish with green metallic sheen.....polita
2. Tarsi orange-yellow; tarsal pads broadly divided (except first segment of metatarsi).....aenea
   Tarsi black; tarsal pads narrowly divided.....sayi

Lytta aenea Say

Typically metallic aeneous green but varying to a nearly pure metallic green or blue. Elytra typically cupreous or cupreous green, rarely purplish. Femora and tibiae orange, the femora often black at apex. Tarsi varying from orange to brownish-gray. Tarsal pads clearly, rather broadly divided except on first segment of metatarsi. Length 9-16 mm. (Selander, 1960).

Ecology: Adults are active in April and May. Adults have been collected feeding on the flowers of Amelanchier spp., Crataegus spp., Prunus spp., Malus spp. (Rosaceae); Salix spp. (Salicaceae); and Carya spp. (Juglandaceae). Adults have also been recorded feeding on the fruit of Pyrus spp. and leaves of Quercus spp. (Fagaceae). Larval hosts unknown. (Selander, 1960).

Range: New Hampshire south to Georgia, west to Texas and Oklahoma and north to Indiana.

Specimens examined: ANNE ARUNDEL CO.: Edgewater, 4/V/82. CARROLL CO.: Westminster, 10/V/77. MONTGOMERY CO.: Burnt Mills, 7/V/78; Cabin John, 30/IV/05; Chevy Chase, 29/IV/19; Great Falls, 17/IV/76; Plummers Island, 27/IV/--, 29/IV/05, 17/IV/03, 23/IV/71. WASHINGTON CO.: Clear Spring, 24/IV/14.

Lytta polita Say

Head, pronotum, and under surface aeneous, shiny. Elytra a duller brassy color. Femora orange with black apex. Metatibiae orange with black base and apex. Pro- and mesotibiae, and tarsi black. Black areas with a green luster. Length 13-22 mm. (Selander, 1960).

Ecology: Adults have been collected at lights. No food or larval hosts have been recorded (Selander, 1960).

Range: Coastal Plain and Piedmont from New Jersey to Florida and Louisiana.

Specimens examined: ANNE ARUNDEL CO.: Chesapeake Beach, 9/IV/33. PRINCE GEORGES CO.: Beltsville, 7/V/69, 20/V/70; College Park, 22/IV/67. WORCESTER CO.: Shad Landing, 19/IV/78.

Lytta sayi LeConte

Metallic green or blue. Femora orange with black apex. Tibiae orange with black base and apex. Tarsi black. Black areas with a green or blue luster. Tarsal pads narrowly divided, those of basal segments often only parted. Length 13-22 mm. (Selander, 1960).

Ecology: Adults are active in May and June. Adults have been collected off of the following plants: Prunus spp., Pyrus spp., Rosa spp. (Roseaceae); Sambucus spp., Viburnum lentago L. (Caprifoliaceae); Robinia pseudoacacia L. (Fabaceae); Carya spp.; Triticum aestivum; Cornus spp. (Cornaceae); and Salix discolor Muhl. Adults feed primarily on flowers. Larval hosts unknown. (Selander, 1960).

Range: Southern Quebec south to Maryland west to eastern Wyoming and Iowa.

Specimens examined: MONTGOMERY CO.: Great Falls, 17/IV/76. PRINCE GEORGES CO.: Upper Marlboro, 13/IV/79.

Epicauta

The genus Epicauta is the largest genus of Meloidae in North America with 102 species (Arnett, 1973). Ten species are recorded from Maryland. The last generic revision was Werner (1945). Since then several species groups have been revised. Most species are variable in appearance.

Epicauta species are predators on Acrididae (Orthoptera) or other Epicauta spp. (Selander, 1981). Most species are univoltine and are active in the fall. Parthenogenesis has been recorded for one species (Adams and Selander, 1980).

Elytra without costae; wings nearly always present. Antennal segment I usually shorter, rarely equal to, and never longer than III; segment II much shorter than III; III to V not elongate, though III may be longest. Profemora with patches of silky pubescence beneath. Next to last tarsal segment cylindrical.

Key to Maryland species

(modified from Werner, 1945)

1. Antennal segment II half as long as III or shorter.....5
   Antennal segment II two-thirds as long as III or longer.....2
2. Antennae with segment I attaining occiput.....3
   Antennae with segment I not attaining occiput (may extend beyond eye).....4
3. Protibiae with one spur. Antennae with segment I S-shaped.....torsa
   Protibiae with two spurs.....fabricii
4. Antennae with segment II and III subequal.....fabricii
   Antennae with segment II longer than III.....torsa
5. Elytra with one or more vittae.....6
   Elytra without vittae.....8
6. Vittae marked on elytra as well as pubescence.....vittata
   Vittae marked in pubescence only.....7
7. Metatibial spurs slender, equal.....strigosa
   Metatibial spurs with outer twice as broad as inner.....atrata
8. Pubescence black over body, white to gray on the suture and margins of elytra.....9
   Not so colored.....10
9. Metatibial spurs slender, spiniform.....cinerea
   Metatibial spurs broadened.....pestifera
10. With uniform black pubescence, at least above.....11
    Pubescence mainly gray to tan.....12
11. Visible portion of scutellum very small. Antennae tapering toward apex.....pennsylvanica
    Visible portion of scutellum normal size. Antennae not tapering toward apex.....atrata
12. With black markings at base of elytra.....13
    No black markings at base of elytra.....15
13. Outer spur of metatibiae broadened.....pestifera
    Outer spur of metatibiae slender.....14
14. Antennae with segment I swollen.....cinerea
    Antennae with segment I not swollen.....floridensis
15. Body brown, legs paler.....batesii
    Body and legs same color.....16
16. Outer metatibial spur broad.....atrata
    Outer metatibial spur slender.....strigosa

Epicauta atrata (Fabricius)

Black or dark brown, the head sometimes red. Body covered with pubescence, usually black but may be gray. Elytra sometimes with gray margins, usually black. Protibiae with inner spur distinctly larger than outer. Metatibiae with both spurs truncate and convex at apex, the outer one twice as broad as inner. Length 6-13 mm.

Ecology: Selander (1981, 1982) reports the larval hosts as the eggs of E. pennsylvanica (DeGeer), E. pestifera Werner, E. vittata (Fabricius), E. immaculata (Say), E. occidentalis Werner, and E. atrata.

Adults have been collected from the flowers of Convolvulus sp., Ipomea sp. (Convolvulaceae); Aster sp., Chrysanthemum sp., Cichorium intybus L., Circium sp., Dahlia sp., Helianthus sp., Rudbeckia sp. (Compositae); Rosa sp.; and Hibiscus sp. (Malvaceae).

Range: Maryland to North Carolina west to Nebraska and Texas.

Specimens examined: CALVERT CO.: no locality, 6/VIII/62. CAROLINE CO.: Denton, 9/VIII/82. HARFORD CO.: Aberdeen, 26/VIII/82; Havre de Grace, 26/VIII/82. HOWARD CO.: Clarksville, 15/VII/76. KENT CO.: Kennedyville, 17/VIII/82. PRINCE GEORGES CO.: Bladensburg, 21/VII/--; Hyattsville, 20/VII/41. QUEEN ANNES CO.: Queenstown, 4/VIII/82. ST. MARYS CO.: Bushwood, 17/VII/73. WASHINGTON CO.: Boonsboro, 5/VIII/1898.

Epicauta batesii Horn

Reddish-brown; head and underside of body except legs darker.

Sparsely clothed with tannish pubescence. Posterior tibial spurs slender, spiniform. Length 6-10 mm. (Werner, 1945).

Ecology: Unknown. Werner (1945) reports adults active in fall and winter.

Range: New Jersey to Florida.

Specimens examined: None.

Epicauta cinerea (Forster)

Body color black. Three forms occur: 1. entirely ash-colored pubescence except on base of elytra; 2. black pubescence on elytra except on margins and suture and a pair of black marks on head and pronotum; 3. entirely black. Metatibiae with spurs spiniform, slender; outer broader. Antennae short, segment I stout. Length 9-13 mm.

Ecology: Larval hosts: Melanoplus differentialis (Thomas), M. femurrubrum (DeGeer), M. sanguinipes (Fabricius), and M. spretus (Walsh) (Orthoptera: Acrididae). Adults have been collected from Clematis sp., Cimicifuga racemosa (L.) (Ranunculaceae); and Lycopersicon esculentum Mill. (Solanaceae).

Adults are active in August and September. Larvae are active in fall. Pupation occurs in early spring (Rees, 1973).

Range: New Hampshire to South Carolina west to Iowa and Oklahoma.

Specimens examined: MONTGOMERY CO.: Cabin John, 2/VIII/30; Plummers Island, 17/VIII/07, VIII/07. PRINCE GEORGES CO.: Branchville, no date; Bladensburg, 16/VIII/13; Fort Washington, no date.

Epicauta fabricii (LeConte)

Elytra black, fairly densely covered with ash-colored pubescence. Elytra with black humeral and scutellar spots. Pronotum bell-shaped. Metatibial spurs flattened, spiniform, outer broader. Length 9-15 mm.

Ecology: Larval hosts: M. bivittatus (Say), M. differentialis, M. femurrubrum, and M. sanguinipes (Rees, 1973). Adults feed primarily on flowers of various legumes.

Range: Maine to Florida west to Montana and New Mexico.

Specimens examined: FREDERICK CO.: Mt. Airy, 23/VI/23; Wolfsville, 11/VI/14. HARFORD CO.: Conowingo, 28/V/41. HOWARD CO.: Jessup, 24/VI/11. MONTGOMERY CO.: Ashton, 19/VI/43; Forest Glen, 28/V/18. PRINCE GEORGES CO.: College Park, 12/VIII/1897, 2/VIII/27. WASHINGTON CO.: Hagerstown, 11/VI/14; Sharpsburg, 15/VI/69.

Epicauta floridensis Werner

Body color black; densely clothed with ash-colored pubescence. Pronotum subquadrate. Metatibial spurs slender, spiniform. Length 6-11 mm. (Werner, 1945).

Ecology: Larval hosts unknown. Adults have been collected from Schrankia uncinata Willd. (Leguminosae).

Range: New Jersey to Florida west to Oklahoma.

Specimens examined: None.

Epicauta pennsylvanica (DeGeer)

Body color black; with short, sparse, black pubescence. No markings on elytra. Pronotum quadrate, front angles rounded. Visible portion of scutellum very small. Metatibial spurs flattened, pointed, outer broader. Length 6-13 mm.

Ecology: Larval hosts: M. femurrubrum, M. sanguinipes, M. spretus, and M. differentialis (Rees, 1973). Adult hosts are Solidago sp., Achillea lanulosa Nutt., Aster spp., Eupatorium serotinum Michx., Grindelia lanceolata Nutt., Gutierrezia spp., Haplopappus ciliatus (Nutt.) (Compositae); Amaranthus spp. (Amaranthaceae); Medicago sativa; and Salsola kali L. (Chenopodiaceae).

Adults of this species emerge in August and feed on pollen. Eggs are laid in September. Larvae are active from fall until spring. Univoltine.

Range: Maine to Florida west to Montana and Texas.

Specimens examined: ALLEGANY CO.: Oldtown, 7/IX/82. ANNE ARUNDEL CO.: Friendship airport, 30/VIII/61; Odenton, 7/IX/66; Woodwardville, 30/VIII/70. BALTIMORE CO.: Granite, 5/X/63; Hebbville, 13/VIII/61; Parkville, 12/VII/71. CARROLL CO.: Reese, 23/IX/67. CECIL CO.: Elkton, 1/VIII/77. HARFORD CO.: Bel Air, 24/VIII/82; Hickory, 24/VIII/82; Pylesville, 23/VIII/82; Street, 24/VIII/82. HOWARD CO.: Dayton, 12/VIII/71;

Woodbine, IX/64. MONTGOMERY CO.: Silver Spring, 25/IX/77; Cabin John, 26/VIII/04, 9/IX/14. PRINCE GEORGES CO.: College Park, 12/VII/22, 16/VIII/15, 19/IX/70, 11/IX/75, 15/X/75, 30/VIII/32; Glen Dale, 12/IX/68. QUEEN ANNES CO.: Price, 27/VIII/82. TALBOT CO.: Easton, 12/IX/77. WASHINGTON CO.: Hagerstown, 20/VII/15, 11/VII/13, 19/VIII/13, 12/VIII/29, 14/VIII/15, 8/VIII/14, 19/VIII/14; Hancock, 8/IX/15.

Epicauta pestifera Werner

Body color black. Two color forms are found: 1. elytra black, densely clothed with black pubescence except on the suture and margins which have ash-colored pubescence; 2. entirely covered with ash-colored pubescence except the extreme base of the elytra, which is black. Body beneath and legs except tarsi with long, gray pubescence. Metatibial spur with inner flattened, pointed; outer broader with blunt tip. Length 6-17 mm.

Ecology: Larval hosts: M. differentialis and M. bivittatus (Horsfall, 1943). Adults have been collected from Solanum tuberosum, Lycopersicon esculentum; Medicago sativa; Trifolium sp.; Brassica oleracea L.; Beta vulgaris L. (Chenopodiaceae); Amaranthus sp.; Cucurbita sp. (Cucurbitaceae); Lupinus sp. (Fabaceae); Aster sp., and Helianthus annuus L. (Compositae).

Range: Atlantic coast west to the Rocky Mountains.

Specimens examined: ALLEGANY CO.: Oldtown, 7/IX/82. ANNE ARUNDEL CO.: Annapolis, 30/VIII/24. BALTIMORE CO.: Cockeysville, 4/VII/70; Hebbville, 1/VIII/63, 1/VIII/61; Parkville, 17/VIII/71. CARROLL CO.: Westminster, 1/VIII/27. CHARLES CO.: Allens Fresh, 5/VIII/72; Marshall Hall, 17/IX/08, 21/VIII/1897, 7/IX/08. HARFORD CO.: no locality, 24/VII/56. MONTGOMERY CO.: Cabin John, VIII/07, 24/VIII/14; Plummers Island, VIII/15; Silver Spring, no date. PRINCE GEORGES CO.: Beltsville, 29/IX/11, 6/VIII/14; Bladensburg, 4/VIII/15; College Park, 23/VIII/20, 16/VIII/15, 26/VII/70; Hyattsville, 28/VII/77; Mitchellville, 27/VIII/77; Upper Marlboro, 25/VII/77, 8/VIII/77. QUEEN ANNES CO.: Botts Neck, 20/VIII/70. SOMERSET CO.: Princess Anne, 2/VIII/82, 9/IX/82. WASHINGTON CO.: no locality, 12/VIII/29. WICOMICO CO.: Delmar, 17/VIII/79.

Epicauta strigosa (Gyllenhal)

Body color black, rather densely pubescent. The black background shows through and affects the general color. Pubescence rust-colored to ash-colored, usually with black or dark brown humeral and scutellar stripes, and a pair of narrow lines on the pronotum. Legs black. Metatibial spurs slender. Length 6-11 mm.

Ecology: Unknown.

Range: Massachusetts to Florida and Mississippi.

Specimens examined: DISTRICT OF COLUMBIA: 13/V/03, 20/VIII/1900.

Epicauta torsa (LeConte)

Elytra black, sparsely clothed with short ash-colored pubescence. There are indistinct black humeral and scutellar spots. Antennae with segment I S-shaped in male; female with apical pit. Antennae, palpi, and legs brownish-gray to brownish-black; mandibles largely reddish. Metatibiae with inner spur spiniform, outer sticklike. Length 7-11 mm. (Werner, 1945).

Ecology: Larval hosts unknown. Adults have been collected from various legumes.

Range: Massachusetts to Florida, west to Texas and Oklahoma.

Specimens examined: None.

Epicauta vittata (Fabricius)

General body color brownish-yellow. Elytra with two or three black stripes per elytron. Pronotum with two longitudinal black stripes. Head with two curved black marks on occiput. Body beneath and legs black. Length 8-16 mm.

Ecology: Adams and Selander (1979) report larval hosts as: M. differentialis, M. femurrubrum, M. atlantis (Riley), M. bivittatus, and Oedipoda sulphurea (Fabricius). Adult food plants are: Clematis sp.; Brassica spp., Raphanus sativus L. (Cruciferae); Passiflora incarnata L. (Passifloraceae); Gossypium sp. (Malvaceae); Fagopyrum esculentum Moench, Rheum rhaponticum L. (Polygonaceae); Cycloloma atriplicifolium (Spreng.), Salsola pestifera A.Nelson, Spinaceae oleraceae L. (Chenopodiaceae); Amaranthus sp.; Portulaca sp. (Portulacaceae); Convolvulus sp., Cuscuta

sp., Ipomoea spp. (Convolvulaceae); Datura stramonium L., Lycopersicum esculentum, Petunia sp., Solanum spp. (Solanaceae); Beta vulgaris, Glycine max, Medicago sativa, Melilotus alba Medik., Phaseolus lunatus L., Trifolium sp. (Leguminosae); Salix sp.; Sagittaria sp. (Alismataceae); and Zea mays L. (Gramineae).

Adults of this species are gregarious, feeding both day and night. Specimens have been collected at light. Adults are leaf and fruit feeders, seldom feeding on floral parts. This species is more common in agricultural areas. Adams and Selander (1979) report that virgin females can lay viable eggs.

Range: Southern Quebec and Connecticut to Florida west to Oklahoma, Kansas and South Dakota.

Specimens examined: ANNE ARUNDEL CO.: Parole, 18/VII/41. CALVERT CO.: no locality, VIII/32. HARFORD CO.: Aberdeen, 1/VIII/73, 15/VIII/74. MONTGOMERY CO.: Rockville, 26/VII/78. PRINCE GEORGES CO.: Calverton, 10/VIII/76; College Park, 5/VII/50, 12/VII/1897, 25/VII/02; Upper Marlboro, 19/VI/79, 9/VIII/79. SOMERSET CO.: Marion, 8/VIII/73; Westover, 16/VII/49. WICOMICO CO.: no locality, 27/VII/76.

Hornia

Hornia is a small genus with four species in North America (Arnett, 1973). One species occurs in Maryland. Adults of this genus present a bizzare appearance in that the eltra are rudimentary and the abdomen is large and sac-like.

Head wider than pronotum, subtriangular. Pronotum as wide or wider than long. Elytra greatly abbreviated, at most only partly covering first abdominal tergite. Wings rudimentary or absent. Abdomen large; sac-like, oval or elongate oval.

Hornia multipennis Riley

Color of head, thorax, and legs pale red to red-brown. Elytra brownish-yellow. Abdomen creamy white with paired, rectangular, dark-brown tergal and sternal plates. Elytra barely extending over basal margin of first abdominal tergite. Length 14-17 mm. (Linsley, 1942).

Linsley (1942) divided the species into two subspecies. Bohart and Selander (1955) questioned the characters used in subspecies determinations. The question may not be settled because Riley did not designate a type.

Ecology: Hocking (1949) found adults active in November in Canada. Adults are apparently nocturnal. Bohart and Selander (1955) found that the adult female does not leave the host nest. Males leave their nests to seek out females. Mating and oviposition occur in the females nest. Adults do not feed. When the eggs hatch the triungulins leave the nest. Hocking (1949) found that the triungulin were quiescent unless presented with two of the following stimuli: 1. approach of a small dark object from above; 2. air currents, especially from above; 3. musical note of pitch E below middle C.

Larval hosts are nest contents of Anthophora spp. (Hymenoptera: Anthophoridae). Several authors note the number of collections from banks with southern exposures.

Range: California to southern Canada east to New York south to the District of Columbia.

Specimens examined: DISTRICT OF COLUMBIA, 19/XI/15.

Nemognatha

The genus Nemognatha contains 26 species in the United States (Enns, 1956), two of which occur in Maryland. Species in this genus are variable in size and coloration making identification difficult. The most recent generic revision was Enns (1956).

Life histories are unknown for most species. Eggs are laid on the phyllaries of buds and flowers of a number of plants, especially Compositae. Larval development is on the nest contents of Hymenoptera.

Wings functional, elytra entirely covering abdomen. Antennae filiform, distal segments not inflated. Eyes moderately large, not produced beneath head. Galeae produced into a sucking tube, sometimes longer than body. Metatibial spurs usually modified. Tarsal claws cleft, upper portion with two rows of fine dents, lower portion reduced to a slender lobe.

Key to Maryland species

(adapted from Enns, 1956)

Metatibial spurs extremely slender, spiniform; mandibles extremely short.....nemorensis
Metatibial spurs distinctly flattened, usually concave; mandibles large, stout.....cribraria fuscula

Nemognatha cribraria fuscula Enns

Body surface shining. Color of head varying from brownish-gray to black; labium and maxillae (except galeae) pale yellow. Antennae with segment II extremely short, one-third or less as long as III; III elongate, longer than IV; segments III to XI subequal, distinctly flattened. Galeae slender, short, scarcely or not exceeding metacoxae. Elytra yellow with a stripe of varying length at apices, usually abbreviated into a crescent-shaped mark on apical fourth of each elytron; usually with sinuous vittae extending from bases to apices, in some specimens the elytra are almost entirely black. Pronotum with two (sometimes three) basal fuscous maculae. Metatibial spurs flattened. Length 7-10 mm. (Enns, 1956).

Ecology: Adults have been collected from flowers of Chrysopsis mariana (L.) and Solidago sp. (Compositae). Larval host unknown.

Range: New York south to North Carolina west to Minnesota.

Specimens examined: DISTRICT OF COLUMBIA: no date. Enns (1956) reports from Maryland.

Nemognatha nemorensis Hentz

Body surface moderately shining. Head varying from yellow to rusty-brown to black above, yellowish below. Eyes, labrum, tips of mandibles, palpi, and galeae black. Pronotum yellowish usually with three black spots in a transverse row on basal third, spots may coalesce to form irregular transverse fascia or may be absent. Galeae exceeding metacoxae. Metatibial spurs slender. Length 5-9 mm. (Enns, 1956).

Ecology: Adults have been collected from flowers of Bidens leucantha L., Erigeron sp., Eupatorium sp., Helianthus sp., Heterotheca subaxillaris Britt. & Rusby, Pterocaulon pycnostachyum (Mich.), and Rudbeckia spp. (Compositae) (Erickson, et. al., 1976). This species is most often collected near wooded areas (Enns, 1956).

Larval host: Chalicodoma sp. (Megachilidae) (Erickson, et.al.1976)

Range: New York south to Florida west to Nebraska.

Specimens examined: Enns (1956) reports from Maryland. Specimens from surrounding states were collected in June and July.

Tricrania

The genus Tricrania contains three species in the United States (Arnett, 1973), with one species found in Maryland. The genus has not been treated thoroughly. Enns (1956) did not include the genus in his revision due to a lack of specimens. Fortunately, life history studies have been conducted for two of the species.

Tricrania sanguinipennis (Say)

Body rather hairy; black. Head and pronotum slightly narrower than base of elytra. Elytra blood red, immaculate. Hind wings absent. Antennae serrate. Tarsal claws double, with a pectinate and thicker upper portion and unequally longer, simple and bristle-shaped lower one. Length 9-11 mm.

Ecology: Parker and Boving (1925) studied the life history of this species. Adults overwinter in host nests in the ground. Adults emerge in a period of one or two days. Mating and oviposition occur at emergence. The females deposit eggs beneath loose objects on the surface of the ground. Adults do not feed.

Eggs hatch about one month later. Triungulin enter the host nest by attaching to an adult host when they alight on the ground. Larvae feed on nest contents of bees. Larval hosts are Colletes rufithorax Smith, C. inequalis Say, and C. thoracicus Smith (Erickson, et.al.1976).

Range: Eastern United States.

Specimens examined: ANNE ARUNDEL CO.: Edgewater, 30/IV/82. MONTGOMERY CO.: Rockville, 7/V/78; Silver Spring, 4/V/70; Takoma Park, 27/IV/69. PRINCE GEORGES CO.: Beltsville, 18/IV/70; College Park, 2/V/65, 26/IV/74; Hyattsville, 4/IV/65.

Zonitis

The genus Zonitis contains 14 United States species (Enns, 1956) with one species found in Maryland. The species of this genus are variable in appearance. Life histories have not been studied for most species. The larvae feed on nest contents of Hymenoptera.

Elytra entirely covering abdomen; wings functional. Antennae filiform, segments not progressively larger distally. Eyes variable in size, rarely produced beneath head. Galeae lobiform or produced into a short sucking organ. Metatibial spurs usually spatulate but variable.

Zonitis bilineata Say

Head, pronotum, legs, and abdomen usually reddish-brown. Elytra usually pale gray or white; female usually with discal black vittae rarely entirely black; male with vittae obsolete or absent. Galeae lobiform, with fringe of pale hairs. Metatibial spurs large, concave and equal. Length 6.5-13 mm.

Ecology: Adults have been collected from flowers of Asclepias sp. (Asclepidaceae); Medicago sp., Ambrosia sp., Cirsium sp., Helianthus spp., Solidago spp., and Veronia spp. (Compositae) (Erickson, et. al., 1976). Enns (1956) states that on Helianthus the eggs are laid in the vein axils on the lower leaf surface.

Larval host unknown. Enns (1956) suggests Megachile (Megachilidae), Melissades (Anthophoridae), and Nomia as possible hosts because species in these genera visit the same flowers.

Range: Most of the United States.

Specimens examined: BALTIMORE CITY: 1/VIII/72, 23/VIII/79. KENT CO.: Chestertown, 13/VIII/1900. PRINCE GEORGES CO.: Bladensburg, 16/VIII/--; College Park, 2/VIII/25, 28/VIII/25.

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Literature Cited

Adams, C.L. and R.B. Selander, 1979. The biology of the blister beetles of the vittata group of the genus Epicauta. Bull. Amer. Mus. Nat. Hist. 162(4):137-266.

Arnett, R.H. 1973. The Beetles of the United States. Amer. Entomol. Inst. Ann Arbor, Mich. 1112pp.

Bohart, G.E. and R.B. Selander, 1955. New records of Hornia multipennis, with notes on its biology. Proc. Entomol. Soc. Wash. 57:121-130.

Enns, W.R. 1956. A revision of the genera Nemognatha, Zonitis and Pseudozonitis in America north of Mexico. Univ. KS. Sci. Bull. 37(17): 685-909.

Erickson, E.H., W.R. Enns, and F.G. Werner, 1976. Bionomics of bee-associated Meloidae: Bee and plant hosts of some Nearctic Meloid beetles--a synopsis. Ann. Entomol. Soc. Amer. 69:959-970.

Hocking, B. 1949. Hornia multipennis: A new record and some notes on behavior. Can. Entomol. 81:61-66.

Horn, G.H. 1885. Studies among the Meloidae. Trans. Amer. Entomol. Soc. 12:107-116.

Horsfall, W.R. 1943. Biology and control of common blister beetles in Arkansas. Ark. Agric. Expt. Stn. Bull. 436.

Linsley, E.G. 1942. Systematics of the Meloid genera Hornia and Allendesalazaria. Univ. CA. Publ. Entomol. 7:169-187.

MacSwain, J.W. 1956. A classification of the first instar larvae of the Meloidae. Ibid. 12:1-182.

Mayer, D.F. and C.A. Johnson, 1978. Bionomics of Meloe niger a predator of the alkali bee, Nomia melanderi. Melanderia. 28:1-22.

Parker, J.B. and A.G. Boving, 1925. The blister beetle Tricrania sanguinipennis - biology, descriptions of different stages, and systematic relationship. Proc. U.S. Nat. Mus. 64(2513):1-40.

Pinto, J.D. and R.B. Selander, 1970. The bionomics of blister beetles of the genus Meloe and a classification of the New World species. Ill. Biol. Mono. 42:1-222.

Rees, N.E. 1973. Arthropod and nematode parasitoids and predators of Acrididae in America north of Mexico. USDA Tech. Bull. 1460. 288p.

Selander, R.B. 1960. Bionomics, systematics, and phylogeny of Lytta, a genus of blister beetles. Ill. Biol. Mono. 28:1-295.

_____. 1964. Sexual behavior of blister beetles. I. The genus Pyrota. Can. Entomol. 96:1037-1082.
_____. 1981. Evidence for a third type of larval prey in blister beetles. Jour. KS. Entomol. Soc. 54:757-783.
_____. 1982. Further studies of predation of Meloid eggs by Meloid larvae. Ibid. 55:427-441.
Werner, F.G. 1945. A revision of the genus Epicauta in America north of Mexico. Bull. Mus. Comp. Zool. 95:421-517.

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THE PREPARATION AND USE OF FERMENTED PEACH MOTH BAIT

Douglas C. Ferguson

Sugaring for moths, a sweet-bait technique believed to have been first used in England in the 1830's, is one of the most time-honored collecting methods. It involves the use of a specially prepared bait of which some form of sugar is an essential component. This may be in the form of crude or refined sugar, molasses, honey, or syrup. Brown sugar and molasses have most commonly been used. Such substances are often mixed with stale beer, rum, or fermented fruit; there is no standard formula. Each lepidopterist has his or her favorite mixture. The particularly successful recipe that I discuss below uses peaches, carefully fermented with ordinary white, granulated sugar. I have used this bait with varying but sometimes spectacular results for many years and at many places in the East from the Atlantic Provinces of Canada to southern Florida, and in the West in South Dakota, Montana, Oregon and Utah.

Preparation of the bait requires a supply of fresh, ripe peaches; culls or windfalls are suitable. Remove the seeds but not the skins, mash the fruit, then place it in one-gallon or larger containers made of plastic, glass, stainless steel, enamelware, or crockery with snugly fitting but not tight covers. Avoid using metal containers that may rust or corrode. Fill each container only half to 2/3 full to allow space for expansion. Add at least one full cup of sugar and place in a moderately warm place (70-90° F) for the mixture to ferment. The bubbling fermentation reaction should start in a day or so and may continue for two weeks or more, depending upon the temperature. During this time, check the fermentation every day or every other day and add sugar until fermentation appears to have subsided completely. If the containers have screw caps do not close them tightly during fermentation. As the added sugar is converted to alcohol, the growth of yeast slows down and eventually ceases.

The bait should remain stable following fermentation and should then be stored in tightly sealed containers to prevent contamination and loss of alcohol through evaporation. If the mixture is allowed to run low in sugar during the fermentation process, vinegar will be produced instead of alcohol. It is therefore important to test the bait by smelling it periodically during preparation to make sure that this is not happening and to add plenty of sugar before it occurs. The amount of sugar consumed will be surprising, usually over three pounds per gallon. The bait should have a sweet, fruity, winelike fragrance. A trace of vinegar is not objectionable, but it is better avoided. Canned fruit such as applesauce may also be used to make the bait, but inasmuch as such products are completely sterile, a small amount of yeast may have to be added to start fermentation. Although this bait may seem troublesome to prepare, it keeps for years and is thus always ready and available at any season.

Before use, the fermented fruit stock mixture described above may be mixed with 30 to 50% molasses or brown sugar or a combination of these. The proportions are not important. This thickens the bait to a better consistency so that it will not run off or dry out as quickly when applied to trees. It also makes the supply last longer.

The best time to apply the bait is in the early evening before dark. It is applied with a 1½ to 3 inch paint brush to tree trunks, fence posts, etc., about shoulder height, usually in patches of 12 to 40 square inches. Choose a definite route along a fairly open trail or the edge of a field that later can be followed in the dark with a lantern or flashlight. Experienced collectors learn to approach the baited trees stealthily from the downwind (leeward) side with a light in one hand and a killing jar in the other, bottling the moths quickly and quietly

before they are frightened off. Some use a head lamp to leave both hands free. The first two or three rounds of the bait are best; after that the activity seems to drop off. Although many moths will fly away and be lost, a net is regarded as an unnecessary encumbrance that will result in greater losses in the end. No more than two or three moths should be caught in one jar before they are transferred to a storage jar to prevent damage. The greatest care must be taken in carrying the jars containing moths so that the specimens do not become rubbed. Sugaring is an especially useful way to collect noctuid moths, but other nocturnal Lepidoptera may also be attracted. Bait applied in the evening will often be found attractive to various diurnal insects on the days following. Collecting with baits is notoriously unpredictable, however. It will sometimes be extremely productive and at other times, under apparently similar conditions, no insects will come. In general, the weather and temperature requirements for good bait collecting are about the same as for collecting with lights. Moonlight, a strong detriment to light collecting, does not seem to affect the attraction of moths to bait.

The same bait mixture may also be used to attract butterflies, sometimes with outstanding results, either by applying it to tree trunks as for moths, or in special butterfly bait traps. It is especially attractive in the North to species of Polygonia and Nymphalis, and once, in the Black Hills, South Dakota, I had more of these butterflies come to bait (used for moths the night before) than I have ever seen before or since. In bait traps in South Carolina it has attracted large numbers of Polygonia interrogationis (Fabricius), Asterocampa spp., Enodia portlandia (Fabricius) and E. creola (Skinner), as well as many other kinds of butterflies, sphingids (especially Amphion nessus Cramer), Catocala spp., and other moths.

The technique of preparing bait given here was described to me in 1955 by John G. Franclemont at Cornell University, but I do not know where or with whom it originated. I have passed the recipe on to several others, but it is still not widely known. A detailed and readable account of sugaring was given by Sargent (1976, pp.83-87), but the present method of preparing bait was not mentioned. It has not been published elsewhere as far as I know, although I included it in a new manual by various authors on the collection and preservation of insects and mites soon to be issued as a Technical Bulletin of the U.S. Department of Agriculture.

Literature Cited

Sargent, T.D. 1976. Legion of Night. The Underwing Moths. Univ. of Massachusetts Press, Amherst. 222pp., illus.

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THE RHIPIPHORIDAE (COLEOPTERA) OF MARYLAND

C. L. Staines, Jr.

The Rhipiphoridae is a small beetle family with 232 species described worldwide. Of these, 50 occur in the United States (Arnett, 1973). Some species are fairly common but are overlooked by collectors. The major reason for this is the short life span of the adults.

The family is of interest because the larvae are parasitic on other insects (mostly Hymenoptera). All species studied are endoparasitic for part of the life cycle. Specific host records are not available for many species; for example, of the 36 Rhipiphorus sp. only nine have host associations. Macrosiagon sp. parasitize wasps (Vespidae, Scoliidae, and Tiphidae) while Rhipiphorus sp. parasitize bees.

The female rhipiphorid lays eggs on flowers visited by the host adult. When the host alights, the rhipiphorid larvae climb onto its body and are carried back to the host's nest where they attack developing larvae. After the first instar, the larvae become more grub-like in form. Host larvae generally complete their development up to pupation before they are killed.

Key to the Maryland genera

1. Elytra reduced, partially or entirely exposing wings; antennae inserted near middle of eyes or above.....2

Elytra entire, covering abdomen and folded wings; antennae inserted below middle of eyes.....Pelecotoma
2. Elytra reduced to scale-like convex plates, not extending beyond second abdominal segment; claws pectinate.....Rhipiphorus
Elytra longer, dehiscent; posterior lobe of pronotum covering scutellum; tarsal claws bifid.....Macrosiagon

Pelecotoma

Pelecotoma flavipes Melsheimer

Description: Elongate, subparallel. Color brown or black with mouthparts and legs yellowish. Eyes emarginate near middle. Antennae 11-segmented, segments I to III paler. Elytra covered with silky pubescence. Length 4-5 mm. (Rivnay, 1929).

Biology: Unknown.

Range: Maine to North Carolina west to Michigan.

Specimens examined: CALVERT CO.: Port Republic, 10/VII/69.

Macrosiagon

Key to Maryland species

1. Mesepisternum convex, bulging beyond lateral margin of pronotum; procoxae contiguous.....2
Mesepisternum more or less flat, not bulging beyond lateral margin of pronotum; procoxae separated by a prosternal spine.....limbatum
2. Pronotum with a distinct process on posterior median lobe; vertex with distinct concavity on front of elevation.....flavipenne
Pronotum without a process on posterior median lobe or with small cup-like concavity; vertex without a distinct frontal concavity....3
3. Metatarsi with second segment shorter than or subequal to third....4
Metatarsi with second segment longer than third....cruentum cruentum
4. Metatarsi with second segment shorter and thicker than third.....5
Metatarsi with second segment subequal to third, slightly thicker, flattened above.....dimidiatum
5. Vertex truncate, flattened or slightly concave in front; occiput with a distinct suture.....savi
Vertex rounded, convex in front; occiput without a distinct suture.. .....pectinatum

Macrosiagon cruentum cruentum (Germar)

Description: Body color black, elytra yellow with a narrow strip at base and tips black or brown. Elytra flat, punctured, narrowing toward apex, tips acute. In males, the black is only on a small area at the tip; in females, about the posterior half is black. Metatarsi with second segment subequal to third. Length 5-11 mm.

Biology: Blatchley (1910) reports that adult females are found on flowers of Pycanthemum linifolium Pursh. (Labiatae).

Range: North America.

Specimens examined: CHARLES CO.: Chicamuxen, 10/VII/73, 17/VII/73. PRINCE GEORGES CO.: Beltsville, 3/VIII/71. WICOMICO CO.: Salisbury, 1/VIII/62.

Macrosiagon flavipenne (LeConte)

Description: Robust, opaque black. Abdomen black in male, red in female with the last segments and posterior margins of tergites brown. Elytra entirely yellow in male; in the female yellow with a narrow band at base and apical half black. Metatarsi with second segment not flat above and as long as third. Length 7-11 mm.

Biology: Barber (1915) reports collecting a pupa of Bembex americanus spinolae Lepeletier (Hymenoptera: Sphecidae) from which this species emerged.

Range: Massachusetts to Florida west to California.

Specimens examined: ANNE ARUNDEL CO.: no locality, 1/VIII/69.

Macrosiagon limbatum (Fabricius)

Description: Head reddish-yellow, vertex often black. Antennae black with segments I and II yellow. Pronotum reddish-yellow usually with a black discal spot varying in size. Elytra usually black. Femora reddish-yellow with black apex. Protibia black, others reddish-yellow with black apex or entirely black. Length 5-12 mm.

Biology: Adults have been taken from flowers of Pycanthemum flexuosum (Walt.), Monarda spp. (Labiatae); Solidago spp., Eupatorium sp. (Compositae); Spiraea (Rosaceae); and Sambucus sp. (Caprifoliaceae) (Rivnay, 1929).

Range: New Hampshire to Florida west to Arizona.

Specimens examined: ANNE ARUNDEL CO.: Friendship, 26/VII/77. BALTIMORE CITY: Leakin Park, 10/VII/77. BALTIMORE CO.: Butler, 13/VII/80 28/VII/82; Hebbville, 26/VII/65; Woodlawn, 7/VIII/65. CHARLES CO.: Chicamuxen, 17/VII/73. FREDERICK CO.: Emittsburg, 1/VIII/65; Thurmont, 9/VIII/65. HOWARD CO.: Centennial, 29/VI/76. KENT CO.: Chestertown, 29/VIII/72. MONTGOMERY CO.: Cabin John, 4/VIII/14, 14/VIII/14, 2/IX/07; Potomac, VII/72, VIII/72; Twin Brook, 28/VII/78. PRINCE GEORGES CO.: Beltsville, 5/VII/71, 30/VII/66, 19/VIII/72; Calverton, 1/VIII/78; Seabrook, 20/VII/78.

Macrosiagon pectinatum (Fabricius)

Description: Color from red to black. Metatarsi with second segment shorter than third. Vertex of head rounded, front surface convex. Occiput without a distinct suture. Elytra usually yellow with six black vittae, but these may elongate so that the elytra are entirely black (and) all marks maybe lacking. The head and pronotum are usually black but may be reddish (or) yellow (Vaurie,1955). Linsley and MacSwain (1951) believe this may be a species complex. Length 4-7.5 mm.

Biology: Davis (1919) reports Tiphia sp. (Hymenoptera: Tiphiidae) as host.

Range: Rivnay (1929) reports this species from all over North and Central America. Vaurie (1955) records specimens from the Atlantic Coast, Arizona, and Mexico.

Specimens examined: ANNE ARUNDEL CO.: no locality, 28/VI/--. PRINCE GEORGES CO.: no locality, 10/VII/--; Bladensburg, 15/VII/--, 21/VII/--; College Park, 21/VII/41.

Macrosiagon savi (LeConte)

Description: Head and pronotum black or yellow, spotted or immaculate; occiput carinate. Elytra yellow with six black vittae or immaculate either entirely yellow or black. Metatarsi with first two segments produced or obliquely truncate. Legs entirely dark brown. Length 7-11 mm.

Biology: Rivnay (1929) reports Myzinum sp. (Hymenoptera: Tiphiidae) as host. Vaurie (1955) reports collecting adults from flowers of Asclepias sp. (Asclepiadaceae).

Range: Pennsylvania and New Jersey south to Florida west to California, Kansas, and Missouri.

Specimens examined: WORCESTER CO.: Snow Hill, 11/VIII/76.

Rhipiphorus

Key to Maryland species

1. First segment of metatarsi obliquely truncate and emarginate at tip; first segment shorter than all others combined.....2
   First segment of metatarsi not obliquely truncate, very little thicker than others; first segment as long as all others combined..3
2. Abdomen black or brown.....luteipennis
   Abdomen yellow.....semiflavus
3. Wings smoky.....4
   Wings clear.....stylopides
4. Wings smoky brown to tip.....schwarzi
   Wings clear with a smoky band.....fasciatus

Rhipiphorus fasciatus (Say)

Description: Color black, feebly shining. Legs and elytra yellow; elytra with brownish basal vittae. Vertex prominent with a median carina. Pronotum conical with median impressed line. Elytra one-third length of abdomen. Length 4-8 mm.

Biology: Linsley, et. al. (1952) report collecting adults in nesting site of Lasioglossum pruinosum (Robertson) (Hymenoptera: Halictidae).

Range: Pierce (1920) records this species from Pennsylvania, Illinois, and Missouri.

Specimens examined: ANNE ARUNDEL CO.: Friendship, 10/VIII/78. BALTIMORE CITY: Leakin Park, 10/VII/77, 13/VII/77. KENT CO.: Kennedyville, 24/VII/75. MONTGOMERY CO.: Carderock, 20/IX/69; Magruders Island,

no date; Silver Spring, 22/VII/70. PRINCE GEORGES CO.: Beltsville, no date, 23/VII/69, 15/VIII/71. WASHINGTON CO.: Woodmont Rd., 12/VII/76.

Rhipiphorus luteipennis (LeConte)

Description: Body black or brown, elytra dark amber yellow. Head large, vertex rounded, sparsely punctate. Pronotum sparsely punctate, pubescent along sides. Front and middle legs yellowish or brownish-yellow, hind legs brown. First segment of metatarsi obliquely truncate and elevated. Metatibia distinctly longer than metatarsi. Length 6-8 mm.
Biology: Unknown.
Range: Maine to Alabama.

Specimens examined: None.

Rhipiphorus schwarzi (LeConte)

Description: Color black. Head very densely punctate; vertex pubescent, slightly carinate. Pronotum densely punctate. Elytra rugose; black with dark reddish-yellow spot near suture. Length 6 mm. (Rivnay, 1929).
Biology: Rivnay (1929) reports Augochlora pura (Say) (Hymenoptera: Halictidae) as the host.
Range: New York to Florida.

Specimens examined: None.

Rhipiphorus semiflavus (LeConte)

Description: Color black. Head with vertex obtuse, conical; without carina. Abdomen yellow, apex black. Legs yellowish, variegated. Length 7.5 mm. (Rivnay, 1929).
Biology: Unknown.
Range: Maryland.

Specimens examined: None. Rivnay (1929) was unable to find any specimens of this species other than the type.

Rhipiphorus stylopides (Newman)

Description: Body black. Antennae reddish-yellow. Legs yellowish. Elytra finely rugulose, not punctate; base brownish, apex amber yellow with a brown vitta. Length 3.5-5 mm.
Biology: Linsley, et. al. (1952) report A. pura as the host.
Range: Canada to the District of Columbia, west to Illinois.

Specimens examined: BALTIMORE CITY: Leakin Park, 10/VII/77. BALTIMORE CO.: Arbutus, 13/VIII/76; Butler, 27/VII/80. GARRETT CO.: no locality, 30/VIII/81. MONTGOMERY CO.: Cabin John, 14/IV/13, 5/VIII/14, 2/IX/14; Plummers Island, 15/IV/02, 29/VI/13, 15/VII/06, 19/VII/05, 31/VII/06, 10/IX/05; Potomac, VII/72. PRINCE GEORGES CO.: Beltsville, 15/VI/13, 22/VII/22, VIII/20; Bladensburg, 19/VII/--; Laurel, 15/VII/12.

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Literature Cited

Arnett, R.H. 1973. The Beetles of the United States. Amer. Entomol. Inst. Ann Arbor, Mich. 1112pp.
Barber, H.S. 1915. Macrosiagon flavipenne in cocoon of Bembex spinolae. Proc. Entomol. Soc. Wash. 17:187-188.
Blatchley, W.S. 1910. An illustrated descriptive catalogue of the Coleoptera or beetles known to occur in Indiana. Nature Publ. Co., Indianapolis. 1385pp.
Davis, J.J. 1919. Contributions to a knowledge of the natural enemies of Phyllophaga. Bull. Ill. Nat. Hist. Surv. 13:53-133.
Linsley, E.G., and J.W. MacSwain, 1951. The Rhipiphoridae of California. Bull. Calif. Insect Surv. 1(3):79-87.
_____, and R.F. Smith, 1952. The life history and development of Rhipiphorus smithi, with notes on their phylogenetic significance. Univ. Calif. Publ. Entomol. 9:291-314.
Pierce, W.D. 1920. Studies in the genus Myodites Latreille. Ent. News 31:277-280.
Rivnay, E. 1929. Revision of the Rhipiphoridae of North and Central

America. Mem. Amer. Entomol. Soc. 6. 68pp.
Vaurie, P. 1955. A review of the genus Macrosiagon in Mexico, with notes on Rhipiphorus. Amer. Mus. Nov. 1717:1-19.

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SOME RECOLLECTIONS OF BUTTERFLY COLLECTING IN MARYLAND IN THE 1930'S

Bryant Mather

As I write these recollections, in November 1982, I have before me three books, books being less perishable than most of the artifacts that would be more relevant to this subject. They are: (a) The Butterfly Guide by W.J. Holland, Doubleday, Doran & Co., N.Y., 1929, 237pp., with 295 colored figures, dedicated by the author to the Boy Scouts of America, which I bought as a Christmas present to me in 1931 for $1.25 and inscribed as my property as a member of BSA Troop 69; (b) Carl Akeley's Africa by Mary L. Jobe Akeley, Blue Ribbon Books, 1929, with a frontispiece reading "Awarded to Bryant Mather for his exhibit at the Second Annual Junior Exhibition of The Natural History Society of Maryland, Baltimore, October 6, 1933;" (c) Field Book of Insects by Frank E. Lutz, G.P. Putnam's Sons, N.Y., 1935, 510pp., a gift to me on graduation from Johns Hopkins University, June 18, 1936.

It was during the summer of 1929 or 1930 that I went to a summer camp ("Camp Canoy") operated by the YMCA and there met a boy who collected butterflies. I then started to collect, also. By 1931, as the fact that I spent $1.25 for a butterfly book reveals, I regarded butterfly collecting as important. Along about this time I discovered the Natural History Society of Maryland which had come into existence by action of a group of generally younger, or at least more active, naturalists who pulled out of the Maryland Academy of Sciences and began to meet in Stan Haydon's laboratory, upstairs over an ex-stable (then a garage) on St. Paul Street. In the NHS I belonged, officially, to the Geology/Mineralogy Dept., since I was then evolving to a career in Geology/Mineralogy, but I could not be other than impressed by the work Stan Haydon was doing on Lepidoptera. In February 1934 I graduated from Baltimore City College and immediately started at Johns Hopkins. With advanced standing plus summer school, I got an AB in geology in 1936 and, as noted, a copy of Lutz.

In 1940 I got a job as curator of minerals in Field Museum, Chicago, and in 1941 I went to work in research on the synthetic sedimentary rock, called concrete, for the Army Engineers, and am still doing that. As soon as it was clear that my professional work was rocks and minerals I needed to revert to another field as an avocation. It was, and is, Lepidoptera. Fortunately I still had a few of the specimens I had collected in Maryland. Two of these were ultimately published, as is recorded in Field et al. (Smithson. Cont. to Zool., No.157, 1974) as: Mather, 1952, Additional Notes on the Harvester Butterfly, Feniseca tarquinius (Fabricius) Md. Nat. 22(3-4):52 and Additional Boloria toddi records from Maryland, Lep. News 10(5):160.

In the first of these I recorded F. tarquinius taken in Wyman Park, Baltimore, June 15, 1932. In the second I recorded taking B. toddi (Holland) (= Clossiana b. bellona Fabr.) at Loch Raven, Baltimore Co., on June 17, 1932 and gave data on others taken by Stan Haydon in 1930 and 1932.

One other specimen, still in my collection, is a female Danaus plexippus (L.) taken at Towson, Baltimore Co., on June 22, 1934 that has a forewing length of only 38 mm. This record was published (Lep. News, Vol. 9(4-5):119-124) where it is recorded that it is 2 mm. less than any among the 1553 examined by Beall & Williams (1945).

I do not have the record, but I have a clear recollection of a Libytheana b. bachmanii (Kirtland) taken at Port Republic, Calvert Co. that I took to a seminar on paleontology at the Hopkins and displayed as I reviewed the fossil insects of Colorado which included relatives of Libytheana. Likewise, again I have no positive documentation, but I recall a Sunday school picnic to Tolchester Beach on the Eastern Shore in the fall where trees along the cliff had as many D. plexippus assembled, prior to migration, as they had leaves. Tolchester Beach was also one locality for Eurytides marcellus (Cramer), then known as "ajax".

For the summer of 1935 I applied for the job of nature counselor at the Boy Scout Camp Linstead, near Severna Park, and was led to be-

lieve I had the job nailed down. But a friend of the Commissioner showed up, wanted it, and got it. I ended up as Handicraft Director but made an insect collection, which was turned over to the Natural History Society for preservation. During the summer there was a black widow spider problem. I got the job of trying to develop the facts for the camp doctor; I still have some of the correspondence on this matter.

In recent years, i.e. since about 1950, I have rarely had the opportunity to visit Maryland. I have visited the National Bureau of Standards at Gaithersburg or the Atomic Energy Commission at Germantown - and once, about two years ago, I lectured in Bethesda, but all these visits were for a few hours only and were usually in the winter. I hope I can come back and collect at least once again.

B.M., 213 Mt. Salus Drive, Clinton, Miss. 39056

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THE BELOSTOMATIDAE (HEMIPTERA) OF MARYLAND

C. L. Staines, Jr.

Belostomatids are large aquatic insects (14-65 mm. in Maryland). Species of this family are predaceous and will consume anything they can subdue. Wilson (1958) describes Lethocerus uhleri (Montandon) feeding on a twelve-inch water snake. Matheson (1907) found a member of this family clinging to a woodpecker. (Some) species may become pests in fish hatcheries (Dimmock, 1886). Part of the success of these insects in attacking large prey is due to the strength and tenacity of the bug. DeCarlo (1959) demonstrated that the paralyzing effect of the toxin injected by belostomatids plays a big role in subduing prey. DeCarlo found that bites of L. annulipes (Herrich-Schaeffer) ultimately resulted in partial or complete paralysis in frogs and eventual death, even when the bug was only allowed a few seconds of feeding time.

Members of the family Belostomatidae have strong thick front legs for grasping prey. The middle and hind legs are broad, flat, and fringed with swimming hairs. The antennae are four-segmented and are concealed in pockets beneath the head. On the apex of the abdomen is a pair of retractable, straplike appendages used to obtain air.

Most belostomatids are sedentary hunters. They perch on submerged vegetation or some other support and wait for prey to swim by. The raptorial front legs are held in readiness and any moving object that is within striking distance is seized. Cullen (1969) found that visual stimuli are the primary trigger for strike reaction.

Menke(1979) records eight genera and 150 species worldwide for the family. Two genera and six species occur in Maryland. Important characters used in identifying belostomatids are shape of tibiae and tarsus; whether the profemur has grooves or not; and the pattern of hair on the connexival plates (also called ventral paratergites).

Both genera that occur in Maryland prefer standing water habitats, especially when there is emergent vegetation. Specimens, especially Lethocerus, will come to lights. Members of the genus Belostoma have the unusual behavior of the female using the male as a mobile egg platform. Smith (1976) working with B. flumineum Say found that the male has a very complex brooding behavior while the eggs are attached to the hemelytra.

Key to the Maryland genera

(adapted from Menke, 1979)

Adults

Metatibia and tarsus strongly compressed, thin, much broader than mesotibia and tarsus; basal segment of rostrum about one-half the length of second; length 40 mm. or more.....Lethocerus
Metatibia and tarsus similar to mesotibia and tarsus; basal segment of rostrum subequal to second; length 30 mm. or less.....Belostoma

Nymphs

Protarsus with two equally developed claws.....Lethocerus
Protarsus with one claw.....Belostoma

Lethocerus contains some of the largest Hemipterans with species ranging from 40 to 110 mm. in length. The rostrum is short and stout with segment I as thick as and one-half as long as segment II, II three-fourths as long as III. Anteoculus moderately developed, distinctly

shorter than interoculus.

Key to Maryland species of Lethocerus

(modified from Menke, 1979)

1. Outer margin of metatibia broadly curved; profemur without grooves.. .....(Benacus) griseus
   Outer margin of metatibia nearly straight; profemur with grooves.... .....(Lethocerus).2
2. Appressed pubescence of first visible connexival plate extending to epimeron.....americanus
   Appressed pubescence covering only one-half to two-thirds the length of the first visible connexival plate.....uhleri

Lethocerus americanus (Leidy)

Body color brown; elongate oval; hemelytra brown with caudal third lighter. Scutellum with large fuscous rectangular area. Meso- and metafemora with three transverse fuscous stripes; profemora broad, with longitudinal grooves bordered by dense dark brown velvety pile and a narrow row of pile between the grooves. Front of head with an indistinct longitudinal media carina; interocular space subequal to width of eye. Length 40.5-61.5 mm.

Ecology: Hoffman (1924) found that L. americanus overwinters as adults in decaying vegetation or burrowed into 2 or 3 inches of mud. There are five nymphal instars, active from May to September. Development from egg to adult requires 33 to 59 days. There is one generation a year.

Range: Throughout North America.

Specimens examined: KENT CO.: Millington, 23/IX/82. PRINCE GEORGES CO.: no locality, 19/IX/68; Beltsville, 17/VIII/69; Glen Dale, 12/IX/68.

Lethocerus griseus (Say)

Profemora not grooved for reception of tibiae, widely clothed with velvety pile. Large, elongate, flat species having interocular space narrower than the diameter of an eye. Legs lack definite stripes but may be mottled. Lateral margins of pronotum straight to slightly convex. Length 45-65 mm.

Ecology: Needham (1907) studied the egg laying habits of L. griseus. He found that eggs are laid in clusters of 75 to 100 in regular rows on plant stems. Individual eggs are 5 mm. long and 2 mm. wide.

Range: Canada west to Minnesota and Iowa, south to Florida and Cuba.

Specimens examined: PRINCE GEORGES CO.: College Park, 19/V/15, 22/IV/43, 29/V/70 at electric light. DISTRICT OF COLUMBIA: 6/V/1899.

Lethocerus uhleri (Montandon)

Color medium brown. Body elongate oval with lateral margins of hemelytra almost parallel. Meso- and metatibiae and femora each with three transverse fuscous stripes. Interocular space equal to two-thirds the width of an eye. Length 40-53 mm.

Ecology: Collected specimens have been from emergent vegetation in slowly flowing streams.

Range: New York to Florida west to Texas, Oklahoma, Kansas, Nebraska, and Minnesota.

Specimens examined: CHARLES CO.: Ironsides, 31/X/83. GARRETT CO.: McHenry, 12/IX/83.

Key to the Maryland species of Belostoma

1. Total length more than 20 mm.....2
   Total length 14 to 18 mm.....testaceum
2. Body elliptical; head about two-thirds length of pronotum..flumineum
   Body more oval; head as long as pronotum.....lutarium

Belostoma flumineum Say

General color varying from uniform brownish-yellow to fuscous. Legs usually with large dark spots. Head short, length before eyes equal to length between eyes. Connexival plates II to V completely covered with hair. Length 21-24 mm.

Ecology: Torre-Bueno (1906) found that oviposition begins in early spring and continues all summer. Eggs are deposited on the backs of males in batches of 25 to 125; the female forcibly seizes the male to

lay eggs. Eggs hatch in 6 to 12 days. There are five nymphal instars. There is probably more than one generation each year, total development time ranged from 43 to 54 days. Hungerford (1919) reared B. flumineum from egg to adult in 40 days. The winter is passed as adults in mud. Smith (1976) found this species in temporary and permanent ponds with emergent vegetation, though B. flumineum prefers emergent vegetation when available. Water quality ranged from clear to extremely turbid. Specimens have been collected from ponds and swamps with emergent vegetation. Some specimens have been collected from back waters of streams.

Range: Transcontinental in southern Canada and the United States south into northern Mexico.

Specimens examined: BALTIMORE CO.: Hereford, 11/VII/70. CECIL CO.: Elk Neck State Forest, 21/VI/70. PRINCE GEORGES CO.: College Park, 31/X/67. Lauck (1964) records from MONTGOMERY CO.: Great Falls.

Belostoma lutarium (Stal)

General color dull yellowish-brown to fuscous. Legs with fuscous spots sometimes coalescing to form bands. Head longer and tylus more convex than other Belostoma species; length anterior to eyes greater than distance from the inner posterior angle of eyes to anterior edge of eyes. Connexival plate II glabrous; appressed hair of plates IV to VII separated from adjacent sterna by a glabrous zone; hair patch on plate VI usually not triangular. Length 22-26 mm.

Ecology: Specimens have been collected from ponds and swamps with emergent vegetation.

Range: Massachusetts to Florida west to Texas, Indiana and Kansas.

Specimens examined: ANNE ARUNDEL CO.: Annapolis, 3/IX/80; Friendship, 10/X/70; Ft. Meade, 30/X/82. BALTIMORE CO.: Hereford, 11/VII/70; Sparks, 10/VII/70. HOWARD CO.: no locality, 8/VI/76. KENT CO.: Galena, 24/IX/82. PRINCE GEORGES CO.: Beltsville, 7/X/70, 17/XI/70; College Park, 28/VII/32, 16/IV/48, 17/IV/48, 19/IX/69; Rock Creek Park, 14/IX/49. WORCESTER CO.: Shad Landing, 4/X/70.

Belostoma testaceum (Leidy)

Color ranging from a nearly uniform pale brownish-yellow to dark fuscous-brown; legs yellowish, irregularly spotted or banded with fuscous; venter fuscous. Head short, obtuse, anteoculus shorter than interoculus. Appressed hair of connexival plates IV to VI separated from sterna by a hairless zone that is as broad or broader than outer glabrous area. Length 14-18 mm.

Ecology: Specimens have been collected from among emergent vegetation of swamps, ponds and marshes.

Range: New York to Michigan south to Texas and Florida.

Specimens examined: BALTIMORE CO.: Hereford, 11/VII/70. PRINCE GEORGES CO.: College Park, III/22, 12/X/70. SOMERSET CO.: Deal Island, no date. ST. MARYS CO.: Lexington Park, 2/VII/60. Lauck (1964) records from ANNE ARUNDEL CO.: Annapolis.

Acknowledgement

I would like to thank C. Mitter, University of Maryland, for allowing me to examine the collection under his care.

References

Bobb, M.L. 1974. The aquatic and semiaquatic Hemiptera of Virginia. The Insects of Virginia. No. 7. 195pp.

Cullen, M.J. 1969. The biology of giant water bugs in Trinidad. Proc. Royal Entomol. Soc. Lond. (A) 44:123-136.

DeCarlo, J.A. 1959. Hemipteros Crypocerata. Efectos de sus picaduras. Prim. Jour. Entomoepid. Argent. Sexta Sex. Cient. pp.715-719.

Dimmock, G. 1886. Belostomatidae and some other fish-destroying bugs. Ann. Rpt. Fish & Game Comm., Mass. Pub. Doc. 25:67-74.

Hoffman, W.E. 1924. Biological notes on Lethocerus americanus. Psyche 31:175-183.

Hungerford, H.B. 1919. The biology and ecology of aquatic and semiaquatic Hemiptera. Univ. Kansas Sci. Bull. 11:1-341.

Lauck, D.R. 1964. A monograph of the genus Belostoma. Parts I, II, III. Bull. Chicago Acad. Sci. 11:34-154.

Matheson, R. 1907. Belostoma eating a bird. Entomol. News 18:452.

Menke, A.S. 1979. Family Belostomatidae in A.S. Menke (ed.). The semi-

aquatic and aquatic Hemiptera of California. Bull. Calif. Insect Survey 21:1-161.
Needham, J.G. 1907. The eggs of Benacus and their hatching. Entomol. News 18:113-116.
Slater, J.A. and R.M. Barnowski, 1978. How to know the true bugs. Wm. C. Brown Co. Publ., Dubuque, Iowa. 256pp.
Smith, R.L. 1976. Brooding behavior of a male water bug Belostoma flumineum. Jour. Kansas Entomol. Soc. 49:333-343.
Torre-Bueno, J.R. dela, 1906. Life histories of North American water bugs. II. Belostoma fluminea Say. Can. Entomol. 38:189-197.
Wilson, C.A. 1958. Aquatic and semiaquatic Hemiptera of Mississippi. Tulane Stud. Zool. 6:115-170.

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A CHECKLIST OF THE HETEROCERIDAE (COLEOPTERA) OF MARYLAND

C. L. Staines, Jr.

The Heteroceridae are small (less than 6 mm. long) beetles which are found in mud banks along the margins of streams. Species are gregarious and are often taken at lights. Members of the family can be recognized by the greatly flattened mandibles and the coarse comb of flattened spines on the outer margin of the pro and mesotibiae.

Pacheco (1964) revised the family for the New World. Identification of species is best done by examining the male genitalia. There are 10 genera and 28 species in the United States (Pacheco, 1978) with five genera and 10 species in Maryland.

Centuriatus auromicans (Kiesenwetter) -- BALTIMORE CITY: Canton, 10/VII/73. DORCHESTER CO.: Cambridge, 17/V/76.
Lanthernarius brunneus (Melsheimer) -- TALBOT CO.: Wittman, VII/72, 14/VII/73. WORCESTER CO.: Pocomoke City, 20/IV/63.
Lanthernarius mollinus (Kiesenwetter) -- FREDERICK CO.: Ellerton, 4/IX/66; Catoctin Furnace, 26/IX/70. HOWARD CO.: Clarksville, 19/IX/70. MONTGOMERY CO.: Gaithersburg, 6/VI/79.
Neoheterocerus angustatus (Chevrolat) -- ANNE ARUNDEL CO.: Edgewater, 17/VI/82. MONTGOMERY CO.: Gaithersburg, 8/VI/79.
Neoheterocerus fatuus (Kiesenwetter) -- KENT CO.: Millington, 23/IX/82.
Neoheterocerus longilobulus Pacheco -- ANNE ARUNDEL CO.: Edgewater, 25/VI/82, 12/VI/81, 28/VI/82. BALTIMORE CO.: Butler, 29/V/81; Hebbville, 7/V/65.
Neoheterocerus pallidus (Say) -- GARRETT CO.: no locality, August. MONTGOMERY CO.: Plummers Island, October.
Neoheterocerus sandersoni Pacheco -- ALLEGANY CO.: Twiggtown, 1/VII/83. ANNE ARUNDEL CO.: Edgewater, 28/VI/82; Tracey Creek, 23/VI/83. BALTIMORE CO.: Hebbville, VI/61; Henryton, 20/IV/63; Reisterstown, 25/VI/61. FREDERICK CO.: Thurmont, 11/VI/83. MONTGOMERY CO.: Gaithersburg, 25/V/72.
Dampfius collaris (Kiesenwetter) -- MONTGOMERY CO.: Plummers Is., July.
Tropicus pusillus (Say) -- ANNE ARUNDEL CO.: Edgewater, 19-26/V/83. BALTIMORE CO.: Butler, 21/VII/75, 16/V/83; Hawkins Point, 3/VII/66; Hebbville, 15/VII/61, 30/IV/62. MONTGOMERY CO.: Potomac, 7/V/62. ST. MARYS CO.: Lexington Park, 21/V/83.

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I would like to thank E.J. Ford and C. Mitter (University of Maryland) for allowing me to examine the collections under their care. I would also like to thank S.L. Staines for translating the Spanish.

Literature Cited

Pacheco, F. 1964. Sistematica, filogenia y distribucion de los Heteroceridos de America (Coleoptera: Heteroceridae). Monografias del Colegio de Post-Graduados 1:1-155.
_____, 1978. A catalog of the Coleoptera of America North of Mexico. Family Heteroceridae. USDA Agric. Handbook 529-47, 8pp.

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NEW DISTRIBUTION AND HOST RECORDS OF CANADIAN TROGUS (HYMENOPTERA: ICHNEUMONIDAE)

Robert T. Mitchell

In 1983 I was able to examine 58 Canadian specimens of the ichneumonid genus Trogus sent to me by Felix Sperling of the University of Alberta and 12 such specimens from the Canadian National Collection in Ottawa. From the identification of these specimens our knowledge of the distribution and host selection of Trogus species, as currently recognized, can be extended beyond that recorded in the recent Catalog of Hymenoptera in America North of Mexico (1979, Krombein et al., Vol. 1, pp.538-539) in the following respects:

Trogus lapidator brevicaudae Heinrich

New Province - BRITISH COLUMBIA (Attachie, Clayhurst Ferry)
New Host - Papilio bairdii Edwards

Trogus lapidator panzeri Carlson

New Province - ALBERTA (Buck Mtn., Drumheller, Dunvegan, Fox Creek, Hinton, Nevis, Peace R., Waterton Nat. Pk.)
BRITISH COLUMBIA (Attachie, Clayhurst Fy., Pink Mt.)
MANITOBA (Riding Mtn.)
SASKATCHEWAN (Outlook)
New Host - Papilio bairdii Edwards, P. kahli Chermock & Chermock, P. zelicaon Lucas.

Trogus pennator var. fulvipes Cresson

New Province - ALBERTA (Coleman, Peace River)
BRITISH COLUMBIA (Clayhurst Ferry, Fort St. John)
New Host - Papilio bairdii Edwards, P. zelicaon Lucas

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BOOK NOTICE

INVERTEBRATE ANIMALS - COLLECTION AND PRESERVATION. compiled by Roger J. Lincoln and J. Gordon Sheals. 1980. Cambridge University Press, New York, Cambridge and London. 150pp. $22.50 (hard cover), $6.50 (paperback).

This manual provides a detailed treatment of collecting and preservation techniques for invertebrate animals other than insects. The underlying principles of fixation and preservation and the biological and distributional notes on collecting are provided for each group of animals. A chapter on collecting methods and apparatus provides information for both amateur and professional collector. The techniques described are not difficult, and the equipment can often be improvised. Collecting methods are provided for free-living animals in terrestrial and fresh-water habitats; external and internal parasites and other epizooic animals. Various methods of killing, fixing and preserving invertebrates are presented in a third chapter. The last chapter deals with proper labeling and the general treatment of collections.

While the manual was intended primarily for persons collecting for the British Museum of Natural History, the information is valuable to anyone interested in invertebrate animals.

Submitted by Eugene J. Gerberg, Ph.D., R.P.E.

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THE SEMIAQUATIC BEETLES OF MARYLAND: I. THE GENUS OMOPHRON (COLEOPTERA: CARABIDAE)

C. L. Staines, Jr.

Omophron is a genus containing eleven species in North America (Benschoter and Cook, 1956). All of the species are found in wet sand along water margins. Little is known about the life history of the species but they are predaceous, nocturnal, and gregarious. Adults do not fly readily but some specimens have been taken at light. The overwintering stage is the adult.

The best method of collecting these beetles is to pour water over a sand bank and pick up adults as they emerge from their burrows. Benschoter and Cook (1956) state that they can be collected at night using a flashlight.

There has been some question as to the placement of this genus. Some authors (Dillon and Dillon, 1961) place it in a separate family, Omophronidae. Others (Arnett, 1973, Benschoter and Cook, 1956) place it in the tribe Omophronini, in the Carabidae. In this paper the classification system of Benschoter and Cook (1956) will be followed.

Key to the Maryland species

1. Pronotum entirely dark with the pale area on the lateral margins even in outline; form broadly oval, sides of elytra and pronotum continuous in outline.....labitus
   Pronotum always with pale area on lateral margins irregular in outline; form less oval, sides of elytra and pronotum not continuous in outline.....2
2. Front with pale area distinctly V-shaped.....americanus
   Front with pale area M-shaped.....tesselatus

Omophron americanus Dejean

Color greenish-black or bronze. Head mostly green, front with pale V-shaped area. Pronotum mostly green with pale lateral margins irregular in outline. Elytra predominantly green with irregular pale area along the margin. Venter reddish-brown, paler at sides and apex of abdomen. Legs pale. Length 5-7 mm.

Ecology: This is the most common species in Maryland. Specimens collected by the author have been from shaded, sandy stream banks.

Range: Canada to Florida west to Arizona, Colorado, Utah, and Idaho.

Specimens examined: ANNE ARUNDEL CO.: Harwood, 23/VI/83. FREDERICK CO.: Thurmont, 11/VI/83. KENT CO.: Millington, 23/IX/82. WORCESTER CO.: Public Landing, 4/X/70; Snow Hill, 2/X/70, 3/X/70, 4/X/70, 14/VI/73. Benschoter and Cook (1956) report from BALTIMORE CO.: Catonsville. MONTGOMERY CO.: Cabin John, Plummers Island. PRINCE GEORGES CO.: Bladensburg. 12 May to 21 September.

Omophron labitus (Fabricius)

Color dark brown to nearly black, shining. Head with dorsal surface coarsely, sparsely punctured; pale area on front V-shaped. Pronotum and elytra predominantly dark with pale lateral margin even in outline. Venter piceous with sides and apex of abdomen paler. Legs pale. Length 5-6 mm.

Range: Coastal areas from New York to Florida and Texas.

Specimens examined: PRINCE GEORGES CO.: no locality, 3/V/--. WORCESTER CO.: Berlin, 27/VI/77.

Omophron tesselatus Say

Color pale yellowish-brown with metallic green markings. Head with green band across base; pale area on front M-shaped. Pronotum with subquadrate green spot with narrow process extending to basal and apical margins along median line. Elytra with metallic green cross-markings. Venter ferrugineous, margins and apex of abdomen paler. Legs pale. Length 5.4-7.0 mm.

Range: Canada to Virginia west to Colorado south to Texas, New Mexico, Arizona and California.

Specimens examined: None. Benschoter and Cook (1956) report specimens from Vienna, Virginia and Harrisburg, Pennsylvania. This species should occur in Maryland.

Acknowledgements

I would like to thank C. Mitter (University of Maryland) and J.F. Cavey for allowing me to examine the collections under their care.

Literature Cited

Arnett, R.H. 1973. The beetles of the United States. A manual for identification. Amer. Entomol. Inst., Ann Arbor, MI. 1112pp.

Benschoter, C.A. and E.F. Cook, 1956. A revision of the genus Omophron (Carabidae, Coleoptera) of North America north of Mexico. Ann. Entomol. Soc. Amer. 49:411-429.

Dillon, L.S. and E.S. Dillon, 1961. A manual of common beetles of eastern North America. Dover Publ., New York. 894pp.

C.L.S., Jr., 3302 Decker Place, Edgewater, Md. 21037

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BLUE JAY BLUES

Wretched bird with feathers blue
How much more, if not for you,
Could I collect from our small yard
If you weren't working quite so hard?

Nothing escapes your hungry glance
From giant moths to tiny ants
And caterpillars of every description.
I think I'm about to have a conniption!

Just when I thought things couldn't be worse
You perpetrated the ultimate curse.
By building a nest in our dogwood tree
You managed to add insult to injury.

Now there are five with an eating propensity
Designed to diminish the insect density.
With screeching and squawking they've urged you on
'Til all but the commonest species are gone.

But now you have gone a little too far
And are dangerously close to all-out war.
The moths that fly outside of my lab
Have not gathered there for you to grab.

They've come from afar, seeking a mate.
Each scale's in place as they arrive for that date.
A brief instant of splendor, a moment of glory,
But death prowls the bushes and changes the story.

A blue streak from above, the snap of a bill,
And the afternoon air is suddenly still.
Mute piles of wings attest each atrocity
Filling this viewer with great animosity.

And those larvae in sleeves, on the side & in back,
Are not there in case you should feel like a snack.
They were hopefully placed beyond your reach
But to tear up the bags is a serious breach.

You've caught many a larva and many a moth
And now you've torn up much too much cloth.
So, you must learn restraint, like it or not,
Or risk "catching" a load of double aught buckshot.

R.S. Bryant, 522 Old Orchard Rd., Baltimore, Md. 21229

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The Maryland Entomologist is published irregularly by the Maryland Entomological Society. There are four numbers in each volume. Original articles on geographic and temporal distribution, particularly pertaining to Maryland and adjacent states, ecology, biology, morphology, genetics, systematics, behavior, etc. are welcome. Book notices and reviews, news of the members, requests for information, notes on distribution, occurrence, migration, life history and others will be published. All articles are subject to editorial review and acceptance. They should be sent to Robert S. Bryant, 522 Old Orchard Road, Baltimore, MD 21229.

This publication will reflect the interests, views, and talents of the entire membership. It will be viable as long as everyone deems his contributions as necessary and meaningful for its continuance.

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NOTICE TO CONTRIBUTORS

Contributors should prepare manuscripts according to the following instructions.

Text: Manuscripts should be submitted in duplicate, and must be typewritten, entirely double-spaced, employing wide margins on all sides (not less than 3/4 of an inch for pica type nor less than 1¼ inches for elite type), on one side only of 8½ X 11 inch paper. The first mention of a plant or animal in the text should include the full scientific name, with authors of zoological names. Carefully check the spelling of all zoological names. Underline only where italics are intended. Short articles and general notes are preferred, up to a maximum of 20 pages. Longer manuscripts, if accepted, may be assessed page charges.

Literature Cited: References in the text to articles or books should be given as, Villiard (1964) or (Villiard, 1964, 1969) and all must be listed alphabetically under the heading LITERATURE CITED, as follows:

Villiard, P., 1964. Multicolored World of Caterpillars. Natural History. LXXIII(4):24-31

_____. 1969. Moths and How to Rear Them. Funk & Wagnalls, New York. 235pp.

Additional references that may be helpful to the reader, and not to exceed six in number, should be listed under the heading SELECTED REFERENCES, in the above manner.

Tables: Tables, graphs and line drawings should be done with indelible, black ink and should be placed on separate sheets, following the main text, with the approximate desired position indicated in the text.

Illustrations: Photographs may be accepted if they are necessary to support the text. Reproduction of photographs may increase the printing cost and authors should expect to pay any extra charges. Photographs should be approximately 2½ X 3½ inches, if depicting single specimens, and not larger than 5 X 7 inches for groups of specimens. They must be black and white, glossy finish and mounted with frosted tape, wax, or rubber cement to an extra sheet of paper. Figure numbers, as cited in the text, and figure legends should be typewritten below each photograph.

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